Notice of Allowability	Application No.	Applicant(s)	
	10/764,580	JIN ET AL.	
	Examiner	Art Unit	
	Lana N. Le	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *1-27/04*.

2. ☒ The allowed claim(s) is/are *1-20 and 72-122*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with applicant's representative, Mike Wiggins, on 4/19/06.

2. The application has been amended as follows:

cancel claims 21-71.

REASON FOR ALLOWANCE

3. The following is an examiner's statement of reasons for allowance:

Regarding independent claim 1, Westwick et al (US 5,945,878) disclose a single-ended-to-differential mixer (fig. 4), comprising:

a differential input circuit (400), wherein the differential input circuit is configured to receive a single-ended input signal (from RF source), wherein the differential input circuit comprises:

a first transistor (402) and a second transistor (404) configured as a differential amplifier to convert the single-ended input signal from a voltage signal (Vbias) to first and second current signals (Iout1, Iout2) (col 3, line 7- col 4, line 8); and

Evans (US 5,280,290) discloses a mixer (fig. 1) having a cancellation circuit (6, 7, 8, 9).

Scoggins (US 6,469,587) discloses a tank circuit (fig. 5), wherein the tank circuit (LC tank circuit) comprises: an inductor (L1); and a tuning capacitor (C15) arranged in parallel with the inductor (L1) (col 7, line 31 - col 8, line 30).

Hatcher et al (US 6,535,725) disclose a mixer circuit (204; fig. 3), wherein the mixer circuit (204) is in communication with the differential input circuit (312) and configured to receive the first and second current signals (LO+, LO-), wherein the mixer circuit (204) is configured to receive a second input signal, wherein the mixer circuit (204) is configured as a Gilbert cell double-balanced switching mixer (310) for generating a differential mixer output signal (differential OUT, OUT+, OUT-) as a product of the first and second current signals (LO+, LO-) and the second input signal (from Q5, Q6) (col 5, line 37-56).

However, Westwick et al, Evans, Scoggins, Hatcher et al and the cited prior art fail to disclose: a resonant frequency of the inductor and tuning capacitor is substantially centered around a predetermined frequency of the single-ended input signal,

a first cancellation circuit, wherein the first cancellation circuit comprises a third transistor, wherein an emitter of the third transistor is in communication with a base of the third transistor, wherein the second cancellation circuit comprises a fourth transistor, wherein an emitter of the fourth transistor is in communication with a base of the fourth transistor, wherein the first and second cancellation circuits are configured to receive the single-ended input signal, wherein collectors of the first and second cancellation circuits are in cross-communication with collectors of the differential amplifier of the

differential input circuit, and wherein the first and second cancellation circuits cancel non-linear capacitance associated with the differential amplifier;

wherein the tank circuit is in communication between a ground and common emitters of the differential amplifier of the differential input circuit, and wherein the tank circuit is configured as a passive current source.

Regarding claim 11, Westwick et al disclose a single-ended-to-differential mixer (fig. 4), comprising:

a differential input circuit means (400), wherein the differential input circuit means is configured to receive a single-ended input signal (from RF source),

wherein the differential input circuit means (400) comprises:

a first amplifier means (402) and a second amplifier means (404) configured as a differential amplifier means to convert the single-ended input signal (at point 418) from a voltage signal to first and second current signals (Iout1, Iout2), wherein each amplifier means (402, 404) includes first, second and third electrode means (col 3, line 7- col 4, line 8).

Evans discloses a mixer (fig. 1) having a first cancellation circuit means (6, 7) and a second cancellation circuit means (8, 9).

Scoggins discloses a tank circuit means (fig. 5), wherein the tank circuit means comprises: an inductive means (L1), and a tuning capacitive means (C15) arranged in parallel with the inductive means (L1); a passive tank circuit (LC tank circuit), wherein the passive tank circuit is in communication between a reference voltage (VsubCC) and the differential input circuit (502).

Hatcher discloses a mixer circuit means (204; fig. 3).

However, Westwick et al, Evans, Scoggins, Hatcher et al and the cited prior art fail to disclose:

the first and second cancellation circuit means are configured to receive the single-ended input signal, wherein first electrode means of the first and second cancellation circuit means are in cross-communication with first electrode means of the differential amplifier means of the differential input circuit means, and wherein the first and second cancellation circuit means cancel non-linear capacitance associated with the differential amplifier means;

a tank circuit wherein a resonant frequency of the inductive means and tuning capacitive means is substantially centered around a predetermined frequency of the single-ended input signal, wherein the tank circuit means is in communication between a reference voltage and third electrode means of the differential amplifier means of the differential input circuit means, and wherein the tank circuit means is configured as a passive current source means; and

wherein the first cancellation circuit means comprises a third amplifier means, wherein a third electrode means of the third amplifier means is in communication with a second electrode means of the third amplifier means,

wherein the second cancellation circuit means comprises a fourth amplifier means, wherein a third electrode means of the fourth amplifier means is in communication with a second electrode means of the fourth amplifier means.

Regarding claim 72, Westwick discloses a single-ended-to-differential mixer (fig. 4), comprising:

a differential input circuit (400) having a single-ended input (input 418 from RF source), wherein the differential input circuit is responsive to a single-ended input signal to generate first and second signals (Iout1, Iout2) ;

Evans discloses a first cancellation circuit (6, 7) and a second cancellation circuit (8, 9),

Hatcher discloses a mixer circuit (204; fig. 3), wherein the mixer circuit (204) is in communication with the differential input circuit (312) and responsive to the first and second signals (LO+, LO-) and a second input signal to generate a differential mixer output signal (differential OUT signal) (col 5, lines 37-56).

However, Westwick et al, Evans, Hatcher et al and the cited prior art fail to disclose wherein the first and second cancellation circuits are responsive to the single-ended input signal, wherein the first and second cancellation circuits are in cross-communication with the differential input circuit, and wherein the first and second cancellation circuits cancel non-linear capacitance associated with the differential input circuit.

Regarding claim 89, Westwick discloses a single-ended-to-differential mixer (fig. 4), comprising:

a differential input circuit means (400) having a single-ended input means (input 418 from RF source), wherein the differential input circuit means is responsive to a single-ended input signal to generate first and second signals (Iout1, Iout2) ;

Evans discloses a first cancellation circuit means (6, 7) and a second cancellation circuit means (8, 9).

Hatcher discloses a mixer circuit means (204; fig. 3), wherein the mixer circuit means (204) is in communication with differential input circuit means (312) and responsive to the first and second signals (LO+, LO-) and a second input signal to generate a differential mixer output signal (differential OUT signal) (col 5, lines 37-56).

However, Westwick et al, Evans, Hatcher et al and the cited prior art fail to disclose wherein the first and second cancellation circuits are in cross-communication with the differential input circuit means, and wherein the first and second cancellation circuits cancel non-linear capacitance associated with the differential input circuit means.

Regarding claim 106, Westwick discloses a method for converting a single-ended input signal to a differential output signal, comprising the steps of:

providing a single-ended-to-differential mixer (fig. 1), wherein the single-ended-to-differential mixer comprises: a differential input circuit (M1, M2) having a single-ended input (input 418 from RF source).

Evans discloses a first cancellation circuit (6, 7) and a second cancellation circuit (8, 9).

Hatcher et al disclose a mixer circuit (204; fig. 3), wherein the mixer circuit is in communication with a differential input circuit (RF circuit 312), using the differential input circuit (312), converting the input signals (RF+, RF-) to first and second signals (314, 316), using the differential input circuit (312); receiving the first and second signals (LO+, LO-) and a second input signal (314, 316), using the mixer circuit (310); and generating a differential mixer output signal (OUT+, OUT-) from the first and second

signals and the second input signal, using the mixer circuit (310) (col 5, line 37- col 7, line 11; col 8, lines 1-5).

However, Westwick et al, Evans, and Hatcher et al and the cited prior art fail to disclose: the mixer receiving the single-ended input signal and converting the single-ended input to the first and second signals; wherein the first and second cancellation circuits are in cross-communication with the differential input circuit; and canceling non-linear capacitance associated with the differential input circuit, using the first and second cancellation circuits.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lana N. Le whose telephone number is (571) 272-7891. The examiner can normally be reached on M-F 9:30-18:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lana Le

4-19-06

LANA LE
PRIMARY EXAMINER